# Light and Lighting

Official Journal of the Illuminating Engineering Society.

Incorporating "The Illuminating Engineer."

32, Victoria St., London, S.W.1.

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Vol. XXXVII.—No. 12 **December, 1944** PRICE NINEPENCE Subscription 10/6 per annum, post free



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## I.E.S.: A New Stage

THE decision to raise the I.E.S. subscriptions, to which reference is made on p.191, marks a new stage in development. It has long been evident that the present organisation, which has served the Society so well in the past, must be extended and strengthened to deal with future plans. Hence the need for a permanent secretary, increased staff and organised voluntary effort on a larger scale.

All this means greater revenue. The change in subscriptions was approved by a large majority (over 80 per cent.) of a big vote (over 700), which might have been even greater but for some dissatisfaction with the procedure rather than with the very moderate increase in subscription proposed.

There may have been some little misunderstanding in this connection. Now that the matter is settled, members in all areas will no doubt willingly accept the new arrangements.

Nevertheless, there seems to be a lesson for the future here. The machinery for contact with the large influx of provincial members, rather hastily improvised during war conditions, should be extended and improved.

## *Alleviation of the Black-out*

The further relaxations in the black-out, announced this month, are of substantial benefit. It is no longer obligatory for those who have substituted light curtains to bestir themselves and restore opaque ones in the event of a siren sounding. The chief remaining difficulty is that of obtaining material, but already windows of moderate luminosity are becoming much more general, to the benefit of passers-by. Now that the conditions imposed on public lighting have been further eased, there has also been considerable improvement here. There can be no question of the relief afforded by such steps as those taken, for example, in the vicinity of Charing Cross, and the additional lighting, supplementary to "moonlight," at selected busy points, answers well. Wayfarers had reason to bless the lighting available during the recent foggy night. (The writer, having no torch, was saved by the opportune apperance of lighted gas lamps in what is a purely residential road.) The diversity of method employed is in strange contrast to the rigidity of the regulations relating to war-time street lighting. A criticism levelled at some installations, with only sources at considerable distances apart lighted, is that the effort to spread the light results in appreciable glare. In some areas the existing war-time (0.0002 ft.c.) lighting has been modified throughout; in others (less satisfactory) only occasional lamps, equipped with deep reflectors, shed local pools of relatively strong light; in others, again, globes and lanterns have been given a coating of diffusing material which "dims" the light but by no means ensures that none passes upwards. It seems evident, however, that the authorities no longer attach importance to accurate compliance with the regulations, in a scientific sense, and we may hope that complete freedom from restrictions is not far distant. One rather odd reaction to the improved lighting is the fear expressed in some quarters that the first effect may be an increase in traffic accidents. Such an effect should only be temporary, but it is quite possible that the sense of greater freedom of movement felt by both drivers and pedestrians may tempt them to take greater risks. In addition, the fact that as yet the lighting is far from uniform, great contrasts being found by drivers in turning from fairly well-lighted thoroughfares into side streets that are completely unlighted, is troublesome and sometimes dangerous to drivers, though this is a weakness that should gradually be eliminated.

# Forthcoming I.E.S. Meetings

## SESSIONAL MEETINGS IN LONDON

**1945.**

**Jan. 1st. Christmas Lectures for Children** (see p. 192.)

**Jan. 9th.** MR. R. GILLESPIE WILLIAMS on **The Poetry of Light.** *(To be held at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.)* **5.30 p.m.**

## MEETINGS OF CENTRES AND GROUPS

**1945.**

**Jan. 5th.** MR. F. MIDDLETON on **Avoiding the Obsolete in Street Lighting.** *(In the Pump Room, Bath.)* **7 p.m.**

**Jan. 5th.** MR. J. ASHMORE on **The Contractor's Point of View.** *(In the Lecture Theatre of the Nottingham Gas Department, Parliament Street, Nottingham.)* **5.30 p.m.**

**Jan. 8th.** MR. E. D. JONES on **The Development of Mercury Discharge Light Sources.** *(In the Leeds Corporation Electricity Showrooms, The Headrow, Leeds.)* **6 p.m.**

**Jan. 8th.** Subject to be announced. *(At the Nether Chapel, Norfolk Street, Sheffield.)* **6 p.m.**

**Jan. 9th.** PROF. D. T. A. TOWNEND on **Infra-Red Radiation by Gas.** *(In the Electricity Showrooms, Market Street, Huddersfield.)* **7 p.m.**

**Jan. 11th.** MR. D. A. STRACHAN on **Lighting for the Aircraft Industry.** *(In the Reynolds Hall, College of Technology, Sackville Street, Manchester.)* **2.30 p.m.**

**Jan. 11th.** PROF. D. T. A. TOWNEND on **Infra-Red from Gas-Heated Sources.** *(In the Bradford Electricity Department Showrooms, Sunbridge Road, Bradford.)* **6.45 p.m.**

**Jan. 17th.** MR. J. M. A. MITCHELL on **Street Lighting: Prospect and Retrospect.** *(At the Cleveland Scientific and Technical Institute.)* **6 p.m.**

**Jan. 19th.** MR. F. C. SMITH on **The Gas Industry.** *(At "The Cadaro," Glasgow.)* **6 p.m.**

**Jan. 19th.** DR. H. E. SEILER on **Light and Vision.** *(At the Heriot Watt College, Chambers Street, Edinburgh.)* **6 p.m.**

**Jan. 26th. A "Brains Trust" Meeting.** *(At the Imperial Hotel, Temple Street, Birmingham.)* **5.30** for **6 p.m.**

*(Secretaries of Centres and Groups are requested to send in particulars of any changes in programmes, mentioning subject, author, place, date and time of meeting; summaries of proceedings at meetings (which should not exceed about 250-500 words) and any other local news are also welcome.)*

# I.E.S.: New Rates of Subscription

The new rates of subscription for I.E.S. members, to which allusion was made in our last issue (November, 1944, p. 174) were formally approved on December 12, when the result of the voting was announced, showing 617 votes for the resolution as compared with 124 against. The great majority of votes cast were naturally by means of proxy cards, only 30 votes (26 in favour and four against) being given personally by those attending, some of whom had already voted by proxy.

To have recorded over 700 votes in such a period as this was surely a rather remarkable achievement, which illustrates the keen interest taken in the Society by its members. In view of this large vote the high proportion in favour of the changes, over 80 per cent., suggests that the changes are acceptable to the majority of members.

The new rates (£3 10s. for Fellows, £2 10s. for Corporate Members, and £1 10s. for Associates) will come into effect on January 1, 1945.

## *Fluorescent Tubes and Their Applications*

On November 17, a regular meeting of the newly-formed I.E.S. Edinburgh Group took place at the Heriot Watt College, when there was an audience of over 70 members and visitors—quite an encouraging number. Mr. A. L. Randall gave a talk on "Fluorescent Tubes and Their Applications," in which the progress of electric lighting up to the present stage was reviewed and a full description of the 5 ft. fluorescent lamp was given. Great interest was shown in the display of tubes using fluorescent materials giving a wide range of colours; also in two tubes of American origin, one of which was 3 ft. long, with a consumption of only 30 watts, whilst the other was a miniature lamp 5 or 6 inches long, and consuming only 4 watts.

There was a good discussion, at the conclusion of which a vote of thanks was proposed by Mr. J. Edwin Lamb. Mr. N. G. Wilson, chairman of the group, presided. It was announced that Dr. Bernard Childs would lecture on Light and Colour at the next meeting, to take place in the Edinburgh University Physics Dept., on December 15. We are glad to note this evidence of progress. Any people in Edinburgh interested in lighting and desirous of joining the society, are recommended to get in touch with the local hon. secretary, Mr. S. G. Batt, 8, George-street, Edinburgh, 2.

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## *Industrial Lighting Problems*

At a meeting held in Halifax on November 17, Mr. H. L. Hubble gave an interesting talk on "Industrial Lighting Problems," which was keenly debated. I.E.S. members and visitors present also conveyed a request that a paper on textile lighting should be arranged in the near future.

This evidence of interest is of good augury in connection with the aim of establishing an I.E.S. Group in Halifax, where a useful nucleus of members has already been collected.

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## *Post-war Street Lighting*

The newly-formed I.E.S. Gloucester and Cheltenham Group held a very successful meeting at the Cheltenham Art School on November 23. There was an excellent attendance, which included many prominent public officials from Gloucester, Cheltenham, and Tewkesbury. An address was given by Mr. W. J. Davey, F.I.E.S., entitled "Short Cuts in Illuminating Engineering." His paper dealt mainly with the many technical aspects of street lighting, of which Mr. Davey has made a special study, and also with factory lighting, post-war prospects being discussed, and was heard with great interest by those present. The chair was taken by Mr. A. L. Morris, supported by the secretary (Mr. I. S. Freemantle). A vote of thanks to the lecturer was moved by Mr. J. F. Edgell (Gloucester), and seconded by Councillor B. J. Dyer (Tewkesbury).

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## *Christmas Lectures for Children*

As we go to press we learn that arrangements have now been fully completed for the I.E.S. Christmas lectures to be given to children in London, which will deal with "The Marvels of Modern Lighting." Eight lectures (two daily at 11 a.m. and 2.30 p.m.), will be delivered on December 27, 28, and 29, and January 1, at the Polytechnic (Regent-street, London). We also learn from Mr. Pye that similar lectures for children in Leeds will be given at the Philosophical Hall on January 3 and 4.

# The Automobile Headlamp

(Summary of a paper read by Dr. J. H. Nelson at the Sessional Meeting of the Illuminating Engineering Society on Tuesday, December 12, 1944.)

In his paper on the above subject Dr. Nelson commenced by reminding his hearers that, in order to enable traffic to move safely at night, road vehicles are equipped with marker lights, in the form of side and tail lamps, which indicate their presence to other road users, and also with headlamps, which light the way for the driver. The latter may be required to give the correct lighting under three distinctly different sets of conditions, namely:—

(a) The open road, when no other road users need consideration.

(b) Passing, when dazzling must be prevented.

(c) When fog seriously reduces visibility.

These three cases, which, as any motorist will realise, are of great practical importance, virtually cover all the lighting problems of concern to the vehicle user. The paper dealt only with the vehicle lamps and their requirements—although the author agreed that the relation between street and vehicle lighting is a subject well deserving care and study.

In dividing the discussion of the problems of vehicle lighting into three separate sections, no decision is implied as to the number of lamps the vehicle should carry. The lighting problems to be solved are quite distinct, but the solutions may be such that a lamp can be made to serve two purposes, either with or without some minor change.

Headlamp beams, Dr. Nelson proceeded, are designed according to carefully worked out scientific principles, and although these principles are applicable to all the three divisions of the subject, their development is most easily described in connection with the open road beam. In the same way the setting of the lamp with respect to the car has the greatest significance in connection with the passing beam, and is therefore treated in the second section. Finally, maintenance of the lamp in good condition, though always desirable, is particularly important in fog; therefore some attention was devoted to the problems of cleaning in the final part of the paper.

The author explained that the aim throughout the paper had been to provide a fundamental solution to each of the problems raised. The circumstances surrounding each case were examined in some detail, and this information was used to draw up a tentative specification of the light output required. Whilst the details of the lamp construction necessary to achieve beams of the type specified were not described, certain aspects of the users' reaction were discussed, since they directly affect the beam itself.

Dr. Nelson proposed what he regarded as an ideal distribution for the open road driving beam. The problem of dazzle was then discussed at length. (Some of those present rather questioned the author's views in regard to the effect of "disability glare" and "discomfort glare.") Dr. Nelson was at pains to explain at some length why the ideal solution, the use of polarised light, was impracticable. The method of "beam control" was, however, described and data quoted to show that the visibility attainable under this system is far better than generally supposed. The problem of fog is also one which does not lead to an ideal solution. Some recent studies of the scattering of light were described briefly, and the author remarked that the type of beam suggested probably represented the most satisfactory means of "aiding movement in fog by the use of visible light."

# A New Theory of Colour Vision

At the nineteenth meeting of the Colour Group, held at the Royal College of Science on November 22, Mr. E. N. Willmer, of the Cambridge Physiological Laboratory, read a paper describing the theory of colour vision which he has recently put forward in a series of letters and articles in "Nature." The paper was entitled "Retinal Structure and Colour Vision," and the author was at pains to point out that this approach to the subject was primarily through the histology of the eye. He first described the rods and cones and the paths by which they were connected to the optic nerve, and pointed out that there were three types of paths, viz., those connecting cones alone, those connecting both rods and cones, and, finally, those connecting rods alone. Only the former two were found in the fovea, and the lecturer pointed out that this was consistent with the fact, to which he had drawn attention, that the fovea, when fixated on a very small field (less than half a degree), acted as if it were blue-blind. For instance, it was possible to match a yellow with a mixture of a red and a blue if great care were taken to bring the images within an angular area of about 20 min. diameter at the very centre of the fovea. A very slight wandering of the eye, however, showed up the marked difference between the two.

The lecturer then went on to outline his theory that the cones alone acted as the red receptor mechanism, with a maximum sensitivity of 590 $\mu$, that there were rods in the fovea which had a spectral sensitivity curve similar to the scotopic visibility curve, and that the combination of rods and cones gave what he called a $\frac{1}{2}$ (R + C) unit with an intermediate sensitivity curve. He stated that these three sensitivity curves in suitable combination gave the ordinary photopic visibility curve, and that the theory was in accord with the facts of colour mixture. Unfortunately, time did not allow the lecturer to deal with this latter part of the subject.

In the course of the rather long discussion that followed the presentation of the paper, much more attention was paid to the dichromatism of the fovea than to the theory of vision in support of which the lecturer had adduced it.

Dr. W. D. Wright confirmed the facts from experiments he had made to check Mr. Willmer's results. Both he and Dr. W. S. Stiles pointed out that the theory, which had originally been a two-mechanism theory, had now acquired a third mechanism. Dr. Stiles described some work which he had recently been doing at the National Physical Laboratory, and which showed a remarkable decrease of blue sensitivity for that part of the retina within $\frac{1}{2}$ degree of the fovea centralis. Prof. L. C. Martin enquired whether it was possible that the different types of colour blindness could be explained on this theory by the failure of some of the path connections which Mr. Willmer had described. The author's reply was non-committal on this point.

It is interesting to note that, as pointed out in a letter from Dr. Stiles to "Nature," published after the delivery of the lecture, A. König, a pupil of Helmholtz, described as long ago as 1897 that he had found for his own eye and for others a marked dichromatism when the eye was very carefully fixated on a small area. This seems to be an interesting example of the neglect and subsequent re-discovery of a phenomenon which, when first noticed, seemed not to have any special significance.

## Lighting in Reconstruction

Under this title the Electric Lamp Manufacturers Association has issued in pamphlet form an account of the recent meeting when the Minister of Reconstruction, the Rt. Hon. Lord Woolton, gave an address on the "Constantly Improving Standard of Light." Sir Robert Renwick ("Organised Industry"), Dr. C. C. Paterson ("Fluorescent Lamps"), and Mr. C. F. Dickson ("A Better Lighted Post-war Britain") also spoke. The addresses are given in full, and there are also illustrations of some of the pleasing exhibits arranged on that occasion, including the "City of Light," which forms an effective tail-piece.

# IMPROVED STREET LIGHTING

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**STANDARD OF ILLUMINATION — 0.02 Foot Candles**

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| CONVERSION UNIT | C77336 | C77337 | C77338 |

**Where BS/ARP 37 is not installed, but holder is available**

| MOUNTING HEIGHT | 10–15 feet | 15–20 feet | Over 20 feet |
|---|---|---|---|
| FITTING | C74569–10 | C74569–15 | C74569–20 |
| ADAPTOR | BC to BC, ES to BC, GES to BC as required | | |
| LAMP | **MAZDA 100 w.** | **MAZDA 100 w.** | **MAZDA 100 w.** |

**Where no holder is available**

| MOUNTING HEIGHT | 10–15 feet | 15–20 feet | Over 20 feet |
|---|---|---|---|
| FITTING | 74570–10 | 74570–15 | 74570–20 |
| LAMP | **MAZDA 100 w.** | **MAZDA 100 w.** | **MAZDA 100 w.** |

**STANDARD OF ILLUMINATION — 0.2 Foot Candles**

**Where holder is available.**

| MOUNTING HEIGHT | 10–15 feet | 15–20 feet | Over 20 feet |
|---|---|---|---|
| FITTING | C70636 | C70636 | C70636 |
| ADAPTOR | BC to BC, ES to BC, GES to BC as required. | | |
| LAMP | **MAZDA 15 w.** | **MAZDA 25 w.** | **MAZDA 40 w.** |

**Where no holder is available**

| MOUNTING HEIGHT | 10–15 feet | 15–20 feet | Over 20 feet |
|---|---|---|---|
| FITTING | C70636 with lampholder and weatherproof cap | C70636 with lampholder and weatherproof cap | C70636 with lampholder and weatherproof cap |
| LAMP | **MAZDA 15 w.** | **MAZDA 25 w.** | **MAZDA 40 w.** |

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# Engineering and the Younger Generation

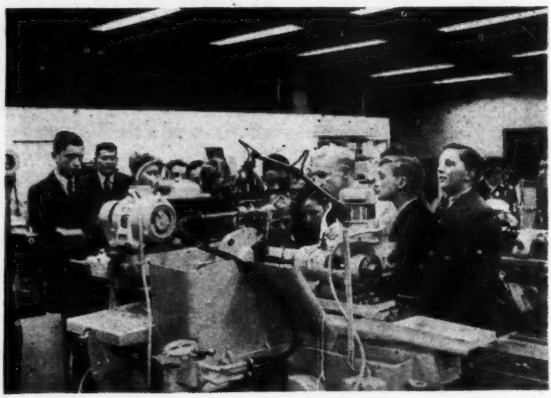
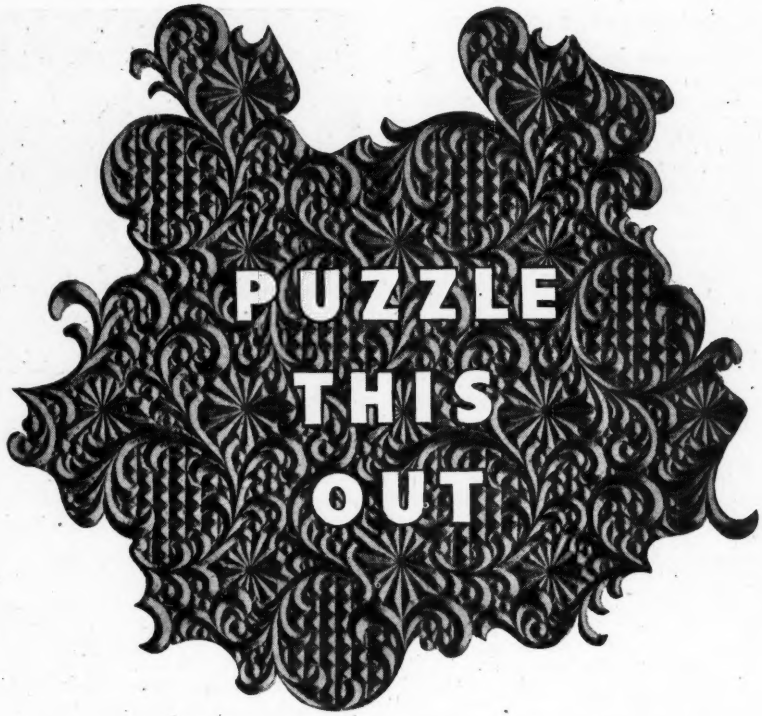


Fig. 1. Young people are much affected by their environment: they appreciate light and cheerful surroundings. The walls of this model engineering shop were light stone in colour, the machines were painted primrose colour and each was independently driven by an electric motor.

Much that the electrical industry is advocating for post-war engineering shops was well illustrated at a recent exhibition sponsored jointly by the Engineering and Allied Employers' Leicester and District Association and the City of Leicester Education Department. In a section of the Granby Halls, Leicester, many examples of engineering processes could be seen in operation under almost ideal conditions. A feature was made of the illumination, which was associated with light coloured surroundings, as shown in the pictures. The children were conducted round the exhibition in relays of about fifty at a time, whilst on Saturday afternoons interested parents were invited to attend. Mr. Ernest Bevin, the Minister of Labour and National Service, journeyed to Leicester to perform the opening ceremony. We are indebted to the General Electric Company Ltd. for this information and for the accompanying illustrations.

Fig. 2. Many of the boys were seeing fluorescent lighting for the first time. Its value in relation to the various engineering processes was explained to them. In the illustration the effect of this mode of lighting on the drawing board is being demonstrated.




Why did the Victorians, when they wanted a semi-obscure glass, produce a bad imitation of a hoar-frost? Glass is a beautiful substance: it looks best in simple and elegant pattern. At any rate, that's what we think today — and that's why "a Chance product" like "Reeded" glass is designed in vertical lines, looking like this in section.

Let's leave the Victorian puzzle embedded in its frame . . . Chance Brothers will continue to produce patterned glasses for people who want well-designed things in their post-war homes — and plenty of light to see them by.

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## Lighting and Production

The part played by good lighting in facilitating "all-out" productive effort has often been emphasised. A good instance is afforded by the works here illustrated, which have recently been relighted by Metrovick fluorescent discharge lamps, coupled with tungsten filament lamps in deep and standard dispersive reflectors.

It is interesting to note that this installation, before relighting, was not precisely a bad one; indeed, the existing lighting of many of the shops already complied with the minimum Factory Act requirements. It was, however, deemed necessary to increase still further the level of illumination in order to enhance production.

The general overhead system adopted furnishes a service illumination of 12 to 15 foot-candles, and has proved very satisfactory. The question of maintenance—an important point in these days of staff shortage—has received special consideration. For example, the works electrical engineer has devised a special "portable bath," which has well proved its worth when reflecting equipment is in need of cleaning. Another point is the provision of a light scheme of decoration which both aids the efforts of the lighting engineer and gives rise to a pleasant "atmosphere." (These two items, maintenance and light surroundings, have been emphasised in the annual report of the Chief Inspector of Factories.)

The lighting scheme was designed by the Illuminating Engineering Section of the Metropolitan-Vickers Electrical Company, Ltd., and the installation work was done by the works electrical staff.

Lighting of shell shop by means of 400 w. fluorescent discharge lamps.


## SITUATION VACANT

**TECHNICAL LIGHTING ASSISTANT required in London by large lamp manufacturers, to prepare lighting schemes for war applications, factories, public lighting, etc. Electrical and lighting experience and technical correspondent essential. Permanent position with post-war prospects for young man free of National Service obligations. Write, stating age, qualifications, experience, and salary required to Box No. 446, "Light and Lighting," 32, Victoria Street, London, S.W.1.**


## The Poetry of Light

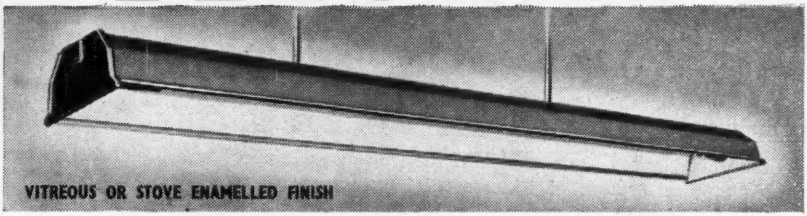
The lecture-demonstration by Mr. R. Gillespie Williams before the I.E.S. Huddersfield Group on December 5 proved a great success. As many as 325 people were present, the audience being swelled by members of other local scientific and other organisations, including several concerned with women's activities.

The meeting took place in the lecture hall of the Huddersfield Technical College, and a vote of thanks by Mr. J. T. Thornton and seconded, on behalf of the visitors, by Dr. Ward, head of the College Engineering Department, expressed the general appreciation. The lecture was subsequently given in Leeds on December 7 when, in spite of very adverse weather conditions, over 100 were present.

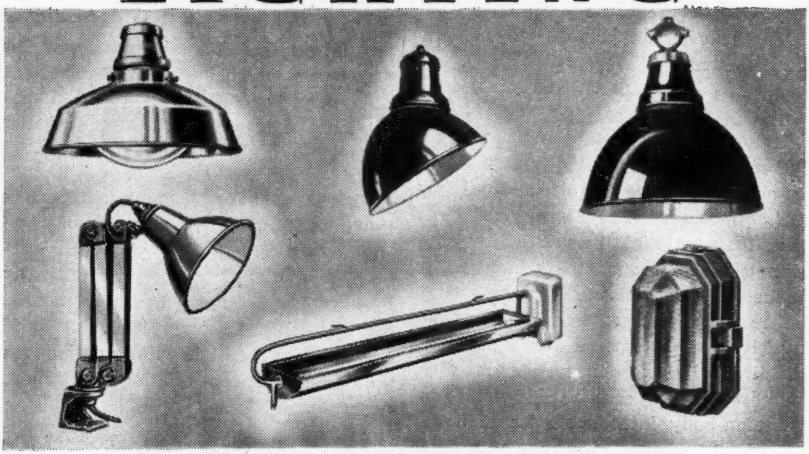
The demonstrations included displays of spectra of sources of light and contrast effects with complementary colours and the effects of changing colours on such objects as ladies' gowns, for which purpose two young ladies rendered effective service, and the combined use of music and colour to evoke different sensations and create the desired atmosphere were also strikingly illustrated.

I.E.S. members in London will doubtless look forward with keen interest to its delivery at the E.L.M.A. Lighting Service Bureau on January 9, 1945.

# EDISWAN




# LIGHTING



# EQUIPMENT

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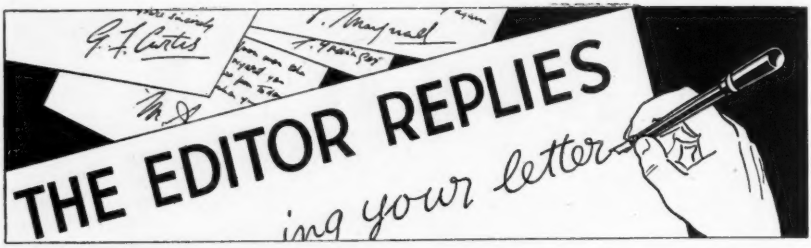


I have been asked some questions in regard to the **Testing of Fluorescent Tubes in Integrating Photometers,** mentioned in our last issue. I am told that, for accuracy, the diameter of the sphere should be not less than four and a half times the extreme dimensions of the source tested.

This would imply that for a 5 ft. fluorescent tube a sphere over 20 ft. in diameter would be required—surely a stiff proposition. For commercial purposes the need might be satisfied by converting a large room into an integrating "cube" with whitened walls. One rather awkward precaution is the screening from the photometric area studied of all direct light from such a lengthy source. The long screen itself would, as a foreign body, introduce some error. I hope, however, shortly to have an article discussing this problem.

The comparative importance and relation between **"disability glare" and "discomfort glare,"** raised in connection with Dr. Nelson's recent I.E.S. paper is a problem of long standing. Although it is convenient to draw this distinction I have always believed that if there is appreciable trouble both will co-exist. One can hardly suffer discomfort from a glare source without perception being in some degree prejudiced—though it may be possible to overcome this by a temporary visual effort. Has not the time arrived when no self-respecting illuminating engineer will tolerate either phenomenon?

A step forward in the study of glare in practice is the recognition that the permissible **brightness of objects** in the field of view should be limited to a **certain multiple of the brightness of the "task"** on which his eyes are directed. L. Weber, in one of the earliest I.E.S. discussions on this subject, suggested 100 to 1.

This is, perhaps, a counsel of perfection, and I prefer the rough rule of "one candle per square inch" for each foot-candle on the table (involving a ratio of 450 to 1), though it has been pointed out that this does not work out quite correctly for the higher illuminations for which a square root relation seems more accurate.

I know that there is a tendency nowadays to think of glare in terms of **candle-power** rather than **brightness.** Bordoni is sometimes quoted in this connection, though he was certainly thinking of objects seen at a considerable distance, e.g., street lamps. Even in that case I prefer bright sources to be screened.

At close quarters there can surely be no question that, for a given candle-power, we very much prefer a screened filament to a bare one. For this reason I have always held that the introduction of **the pearl lamp,** which diffuses the light and reduces the brightness without

*(Continued on page 202)*

## I.E.S. Lighting Reconstruction Pamphlets

These pamphlets, introduced by the I.E.S. as a contribution to the study of post-war lighting problems, have all had a good reception, but we understand that the demand for the one last issued, No. 5, entitled "Public Lighting in the City and Highway," has been unprecedented—this is evidently one subject in which local authorities are taking an exceptional interest. We advise any readers who have not yet made application for this pamphlet to do so before the stock is completely exhausted. (We are all aware of the consequences of the paper shortage and the consequent difficulty in arranging repeat printings, once the original supply is exhausted.)

We are asked to add that stocks of the four preceding pamphlets, entitled "Principles of Good Lighting," "The Lighting of Public Buildings," "The Lighting of Schools," and "Natural Lighting" are still available. Orders for these, too, will be welcome. All may be obtained on application to the Illuminating Engineering Society, 32, Victoria-street, London, S.W.1. The price of all these publications is the same (single copies 1s. each, 9s. per dozen, £3 per 100).

## Large Turbo-Alternators

We note some interesting data on the above and other machinery recently made public by C. A. Parsons and Co., Ltd. Amongst other things a 25,000 Kw. tandem alternator for an Australian power station, a surface condenser for another 40,000 Kw. unit, and a 3-phase transformer bank of 31,500 K.v.a. are illustrated. Although dynamo-electric machinery is outside our scope we mention these facts as an indication of gigantic engineering operations now in progress which the world will no doubt have an opportunity of better appreciating in time to come.

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LIGHTING UNDER POST-WAR CONDITIONS

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*(Continued from page 200)*

any material loss of light, deserves to be ranked as one of the greatest advances in lamp design. (I am sorry, by the way, that the smallest lamps seem now to be obtainable only with clear bulbs).

I have been asked whether, if a single source is unduly glaring, its effect is diminished if a light background is substitued for a very dark one? I think this is accepted. What happens, then, if instead of the one source we have a large number placed close together? Do they then become a **large luminous area of moderate average brightness** and therefore innocuous?

I do not think so. Sources of glare do not become less troublesome if there are fifty instead of one. A ceiling lighted, by indirect means, to a brightness equal to that of an incandescent filament would surely be intolerable—a circumstance appreciated in the U.S.A. when they began to ask, " What is wrong with our 50-ft.c. installations?"

I have been asked what is the present position in regard to the **international unit of light.** Those interested would do well to consult a valuable paper on this subject presented by Dr. J. W. T. Walsh shortly after the outbreak of war. (Trans. I.E.S. (Lond.) ), vol. 5, 1940, p. 89.) The " candle " which we use in this country is, in fact, the international candle accepted abroad, which was formerly preserved in terms of standard filament lamps exchanged between the chief laboratories, and is practically identical with the " new candle " since proposed. In 1937 it was proposed to relate this " new candle " to **a new absolute standard** based on the use of incandescent platinum maintained at a specified temperature—but the outbreak of hostilities prevented further international action.

Inquiries constantly reach me in regard to the **types of fluorescent lamps** likely to be available after the end of the war. On this subject lampmakers, like Brer Rabbit, " lie low and say nuffin "—perhaps because even they do not know yet. I think, however, it may safely be predicted that within quite a short time after the release from war restrictions quite a wide range of fluorescent lamps, varying in size, candlepower, and colour of light emitted, will be introduced, though the variety may not be so great as that in the U.S.A.

In spite of this, however, filament lamps will continue to be used for everyday lighting for quite a long time to come. We shall not go over all at once and completely to fluorescent lighting.

Nor do I think that fluorescent effects *per se*, i.e., the excitation of fluorescent surfaces extraneous to the source by U.V. radiation or so-called " black light " is likely to prove an efficient substitute for ordinary methods of lighting. Such effects will, however, have immense possibilities for decorative and display purposes, owing to the striking contrasts and wide range of colours available. As decorative objects (e.g., studded in wallpapers) fluorescent materials may play a definite part in interior lighting—but *for effect*, not for the purpose of providing a working illumination.

In conclusion, as a result of remarks in the last issue (p. 188), I have been asked whether, in view of the admitted importance of colour schemes in relation to lighting, it is not possible to give some definite guiding rules instead of rather vague general principles. This must stand over. Some suggestions might, however, be derived from Mr. Gillespie Williams or the British Colour Council.

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